AMENDMENT

Please amend the case as follows:

In the Claims

Please amend the claims to read as follows.

1. (Currently amended) A communications system that comprises:

a subscriber modem;

a central office modem; and

a communications channel coupled between the subscriber modem and the central office modem and configured to transport uplink signals from the subscriber modem to the central office modem, and further configured to simultaneously transport downlink signals from the central office modem to the subscriber modem,

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wherein the power spectral density of the transmitted uplink signals is proportional to the power spectral density of the transmitted downlink signals, and

wherein the power spectral density of the transmitted uplink signals is substantially unequal to the power spectral density of the transmitted downlink signals.

2. (Original) A communications system that comprises:

a subscriber modem;

a central office modem; and

a communications channel coupled between the subscriber modem and the central office modem and configured to transport uplink signals from the subscriber modem to the central office modem, and further configured to transport downlink signals from the central office modem to the subscriber modem,

wherein at frequencies below a selected frequency M_{E2F}, the power spectral density of the transmitted uplink signals is proportional to the power spectral density of the transmitted downlink signals by a positive scale factor, and

wherein at frequencies above M_{E2F}, the power spectral density of the uplink signals are limited to one or more uplink frequency bands and the downlink signals are limited to one or more downlink frequency bands that are disjoint from the uplink frequency bands, and wherein the total bandwidth of the uplink frequency bands is proportional to the total bandwidth of the downlink frequency bands by the same positive scale factor.

3. (Original) A communications system that comprises:

a subscriber modem;

a central office modem; and

a communications channel coupled between the subscriber modem and the central office modem and configured to transport uplink signals from the subscriber modem to the central office modem, and further configured to transport downlink signals from the central office modem to the subscriber modem,

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wherein when the connection is initialized, frequency bands are allocated to the uplink and downlink power signals so that the total uplink and downlink capacity is maximized over the channel for predetermined uplink and downlink average signal powers,

wherein the predetermined uplink and downlink average powers are unequal.

4. (New) A method for communicating over a communications channel between at least two modems, the method comprising:

receiving an uplink signal having a transmitted uplink power spectral density ("PSD"); and

transmitting a downlink signal with a transmitted downlink PSD that is proportional (but substantially unequal) to the transmitted uplink PSD.

5. (New) The method of claim 4, further comprising:

optimizing the transmitted uplink PSD to maximize a sum of uplink and downlink capacities subject to a proportionality constraint between the transmitted uplink and downlink PSDs.

6. (New) A method for communicating over a communications channel between at least two modems, the method comprising:

receiving an uplink signal having a transmitted uplink power spectral density ("PSD"); and

transmitting a downlink signal with a transmitted downlink PSD,

wherein at frequencies below a selected frequency M_{E2F}, the transmitted downlink PSD is proportional to the transmitted uplink PSD by a positive scale factor, wherein at frequencies above the selected frequency M_{E2F}, the transmitted downlink PSD is nonzero in one or more frequency bands that are disjoint from one or more frequency bands in which the transmitted uplink PSD is nonzero, and wherein the total bandwidth of the uplink frequency bands above the selected frequency is proportional to the total bandwidth of the downlink frequency bands above the selected frequency by the same positive scale factor.

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7. (New) The method of claim 6, further comprising:

optimizing the transmitted downlink PSD to maximize a sum of uplink and downlink capacities subject to a proportionality constraint between the transmitted uplink and downlink PSDs below the selected frequency, and subject to the bandwidth proportionality constraint above the selected frequency.

8. (New) The method of claim 7, wherein said optimizing includes:

determining a self-NEXT transfer function and a self-FEXT transfer function;

determining an amount of uncorrelated interference into the communications channel;

dividing a frequency spectrum of the communications channel into a plurality of frequency bins; and

selecting a crossover frequency bin M_{E2F} in response to the self-NEXT transfer function and the self-FEXT transfer function, wherein SPSD signaling leads to a greater channel capacity than FDS signaling for bins lower in frequency than M_{E2F}, and wherein FDS signaling leads to a greater channel capacity than SPSD signaling for bins greater in frequency than M_{E2F}.

9. (New) A method for communicating over a communications channel between at least two modems, the method comprising:

jointly optimizing a transmitted uplink PSD and a transmitted downlink PSD to maximize a sum of uplink and downlink capacities subject to a predetermined average uplink power and a predetermined average downlink power, wherein the predetermined average uplink and downlink powers are unequal;

receiving an uplink signal having the optimized transmitted uplink power spectral density ("PSD"); and

transmitting a downlink signal with the optimized transmitted downlink PSD.

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10. (New) The method of claim 9, wherein said optimizing includes:

determining a self-NEXT transfer function and a self-FEXT transfer function;

determining an amount of uncorrelated interference into the communications channel;

dividing a frequency spectrum of the communications channel into a plurality of frequency bins; and

selecting a crossover frequency bin in response to the self-NEXT transfer function and the self-FEXT transfer function, wherein SPSD signaling leads to a greater channel capacity than FDS signaling for bins lower in frequency than and wherein FDS signaling leads to a greater channel capacity than SPSD signaling for bins greater in frequency than the crossover frequency bin.

11. (New) The method of claim 9, wherein said optimizing includes:

at frequencies below a selected frequency, constraining the transmitted downlink PSD to be proportional to the transmitted uplink PSD by a positive scale factor, and

at frequencies above the selected frequency, constraining the transmitted downlink PSD to be in frequency bands disjoint from the transmitted uplink PSD.

12. (New) The method of claim 11, wherein at frequencies above the selected frequency, said optimizing further includes constraining the total bandwidth of the downlink frequency bands to

be proportional to the total bandwidth of the uplink frequency bands by the same positive scale factor.

13. (New) A modem for communicating over a communications channel, wherein the modem is configured to:

receive an uplink signal having a transmitted uplink power spectral density ("PSD"); and

transmit a downlink signal with a transmitted downlink PSD that is proportional (but substantially unequal) to the transmitted uplink PSD.

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14. (New) The modem of claim 13, wherein the modem is further configured to:

optimize the transmitted uplink PSD to maximize a sum of uplink and downlink capacities subject to a proportionality constraint between the transmitted uplink and downlink PSDs.

15. (New) A modem for communicating over a communications channel, wherein the modem is configured to:

receive an uplink signal having a transmitted uplink power spectral density ("PSD"); and

transmit a downlink signal with a transmitted downlink PSD,

wherein at frequencies below a selected frequency M_{E2F}, the transmitted downlink PSD is proportional to the transmitted uplink PSD by a positive scale factor, wherein at frequencies above the selected frequency M_{E2F}, the transmitted downlink PSD is nonzero in one or more frequency bands that are disjoint from one or more frequency bands in which the transmitted uplink PSD is nonzero, and wherein the total bandwidth of the uplink frequency bands above the selected frequency is proportional to the total bandwidth of the downlink frequency bands above the selected frequency by the same positive scale factor.

16. (New) The modem of claim 15, wherein the modem is further configured to:

optimize the transmitted downlink PSD to maximize a sum of uplink and downlink capacities subject to a proportionality constraint between the transmitted uplink and downlink

PSDs below the selected frequency, and subject to the bandwidth proportionality constraint above the selected frequency.

17. (New) The modem of claim 16, wherein as part of said optimizing, the modem is configured to:

determine a self-NEXT transfer function and a self-FEXT transfer function;

determine an amount of uncorrelated interference into the communications channel;

divide a frequency spectrum of the communications channel into a plurality of frequency bins; and

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select a crossover frequency bin M_{E2F} in response to the self-NEXT transfer function and the self-FEXT transfer function, wherein SPSD signaling leads to a greater channel capacity than FDS signaling for bins lower in frequency than M_{E2F}, and wherein FDS signaling leads to a greater channel capacity than SPSD signaling for bins greater in frequency than M_{E2F}.

18. (New) A modem for communicating over a communications channel, wherein the modem is configured to:

jointly optimize a transmitted uplink PSD and a transmitted downlink PSD to maximize a sum of uplink and downlink capacities subject to a predetermined average uplink power and a predetermined average downlink power, wherein the predetermined average uplink and downlink powers are unequal;

transmit a uplink signal with the optimized transmitted uplink PSD; and

receive an downlink signal having the optimized transmitted downlink power spectral density ("PSD").

19. (New) The modem of claim 18, wherein as part of said joint optimizing the modem is configured to:

determine a self-NEXT transfer function and a self-FEXT transfer function of the communications channel;

determine an amount of uncorrelated interference into the communications channel;

divide a frequency spectrum of the communications channel into a plurality of frequency bins; and

select a crossover frequency bin in response to the self-NEXT transfer function and the self-FEXT transfer function, wherein SPSD signaling leads to a greater channel capacity than FDS signaling for bins lower in frequency than and wherein FDS signaling leads to a greater channel capacity than SPSD signaling for bins greater in frequency than the crossover frequency bin.

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20. (New) The modem of claim 18, wherein as part of said joint optimizing the modem is configured to:

at frequencies below a selected frequency, constrain the transmitted uplink PSD to be proportional to the transmitted downlink PSD by a positive scale factor, and

at frequencies above the selected frequency, constrain the transmitted uplink PSD to be in frequency bands disjoint from the transmitted downlink PSD.

21. (New) The modem of claim 20, wherein as part of said joint optimizing, the modem is further configured to constrain the total bandwidth of the uplink frequency bands at frequencies above the selected frequency to be proportional to the total bandwidth of the downlink frequency bands at frequencies above the selected frequency by the same positive scale factor.